Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Carrier Current Systems, including Broadband	)	
over Power Line Systems	)	
Amendment of Part 15 regarding new requirements	)	
And measurement guidelines for Access Broadband	)	
over Power Line Systems	)	ET Docket No. 04-37

COMMENTS OF
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The writer received a BSEE and MSEE from UCLA, 1977 and has been employed as an electrical engineer involved in the power electronics and industrial electronics industries for 30 years, mainly in product development. This experience includes numerous encounters with FCC emission requirements including designing, building and testing equipment for compliance. The writer has also been issued 9 patents and currently holds the call sign N0JCG as a member of the Amateur Radio Service.

I appreciate this opportunity to comment to the Commission on the referenced Proposed Rulemaking. I further appreciate that the Commission saw fit to at least maintain the emission limits of part 15, rather than granting the increases sought by Broadband over Power Line (BPL) proponents. I also appreciate the insistence of the Commission that the non-interference requirement of part 15 also remains intact. In fact, I note with interest that the non-interference requirement of part 15 is referenced no less than five times in the text of the NPRM.

Nonetheless, I feel there are a number of areas that the proposed amendment of part 15 can be further clarified and strengthened, namely in the areas of identification, interference elimination, and notification.

IDENTIFICATION

When experimental licenses were issued for the BPL test sites, they were exempt from the standard requirement for an over the air identification. Perhaps the idea was that such low power operations would be so local as to make identification obvious. However, other users of the spectrum that BPL was using were themselves not notified and had no way to identify the new interference, thus no clue as to whom to report it to. Also, on several occasions, BPL operators themselves, when confronted with audio evidence of interference claimed that their equipment was not the cause. Thus the BPL operators trumpeted that there were no interference complaints, and BPL opponents were at a loss of where to place the blame. The result was a serious level of mistrust between the concerned parties.

To avoid this problem in the future I propose that Access BPL have a very clear, unambiguous, over the air ID mechanism. There is much precedence in FCC rules for this, beginning with the very purpose of the founding of the FCC. Until the proliferation of part 15 devices, all emitters were required to provide some sort of identification. Even Campus Radio installations were encouraged to provide some sort of ID so

transmissions could be traced back to their source. More recently, NPRM FCC 04-100 Proposing to allow wireless broadband operations in the 3650 to 3700 MHz band would amend part 15 with the following;

> (f) Within any one second interval of signal transmission, each unlicensed device must transmit a transmitter identification at least once. The identification must be confined to the 3650 – 3651 MHz portion of the band. Each application for equipment authorization must declare that the equipment contains the required transmitter identification feature and must specify a method whereby interested parties can obtain sufficient information, at no cost, to enable them to fully detect and decode this transmitter identification information. Upon the completion of decoding, the transmitter identification data block must provide the following fields.
>
> (1) User/owner contact information.
>
> (2) Current physical location of the unlicensed device.
>
> The grantee must implement a method that makes it possible for users to specify and update this data.

If this rule is necessary for the 3650 to 3700 MHz, which is geographically limited by the physics of microwaves, it certainly should apply to energy on the power lines in the HF spectrum. Furthermore, part 15 itself is currently very specific about using shutdown as an interference diagnostic technique. In the context of a touch lamp or possibly even an in-house BPL system, power to the device is under the control of the individuals on the scene and this is quite appropriate. However, it is very difficult to apply to access BPL since the means of shutdown is not under the control of the victim.

As to the nature of this identification, I would propose something very simple. Simple on-off keying of the entire carrier constellation at very specific times would not only provide a clear, unambiguous ID, but would allow use of the shutdown diagnostic without actually shutting down the system. International Morse Code has a duty cycle around 50%, so the max throughput of a leg using Morse for the ID would fall to half for the 90 seconds or so necessary. Alternatively, there is no reason that the BPL provider couldn't shift to a different constellation during the off time, not only providing ID in another band segment (kind of an inverse Morse), but also providing the ID without any hit in baud rate.

Implementing an on off keying ID on an OFDM system borders on the trivial. BPL providers have already indicated that they have the ability to turn carriers on and off at will, and this is further discussed in paragraph 42 of the NPRM. All that needs to be done is to define a standard protocol. I would suggest 5WPM International Morse sending an identifying number sequence, repeated at least four times a day at regular intervals. The actual time of the ID can be up to the BPL operator, but the time must be precisely reflected in the on line BPL databases.

A standardized over the air ID mechanism that does not interfere with system operation, as I have described above, also allows the BPL operator to very quickly ‘close the loop’ on an interference complaint. Upon receipt of a complaint, the BPL operator can activate the systems ID software on the BPL device. The interfered party can them immediately verify whether or not that is the cause of his interference.

INTERFERENCE ELIMINATION

The proposed part 15 amendment covering BPL calls for "interference mitigation". Nowhere else in Part 15 is the concept of "mitigation" mentioned. The dictionary definition of mitigation is the reduction of something, not the elimination. All other passages in Part 15 place the burden of interference elimination on the part 15 user, not just a burden to arbitrarily reducing the effect and already, we are starting to see BPL operators arguing that the interference they are causing is not ‘harmful’. While I am of the opinion that any interference that raises the existing noise floor is harmful, I can see the need to somehow quantify the effect. An on off keyed over the air ID mechanism will allow for some quantification of the

interference. BPL providers have been saying for over a year that their systems do not cause interference, much less harmful interference. Southern in quoted in paragraph 25 of the NPRM as saying "Emissions from its system are compliant with Part 15 requirements and, in fact tend to be in the noise floor." And in paragraph 33 the Commission observes, "While we agree that there is some potential for Access BPL to cause harmful interference to radio services, we also tentatively conclude that the likelihood of such harmful interference is low under the current limits and that where such interference does occur, there are remedies that the Access BPL operator can employ to eliminate such interference". Since the BPL manufacturers insist that their equipment can completely avoid transmitting RF energy on any frequency, the commission should accept nothing less than elimination of all BPL generated RF in the frequency range of complaint. The Commission is relying heavily on the ability of BPL operators to deal with interference issues through power reduction and frequency notching. Thus I also propose that each BPL device, after installation and before network operation, be required to demonstrate the ability of the notching mechanism to remove all RF energy in 100Khz increments throughout the frequency range in use. The BPL providers should welcome this acceptance test as an opportunity to demonstrate the ability of their equipment to meet the requirements of the Commission.

The proposed Part 15 amendment directs the BPL operators to use frequency notching and reduced power to avoid interference. To date, their field use of these techniques has the effect of moving the interference from one band segment to another, not actually eliminating it. While this does demonstrate the flexibility of OFDM technology, it illustrates a few other problems. The first is that in order for BPL to operate, some current HF occupants must share spectrum. In the NPRM the Commission has noted that Public Service users tend to operate significantly above the noise floor, and thus may be able tolerate a local increase. The Commission also concedes that other licensed HF users operate at signal levels barely above the noise floor. In fact, the Amateur Radio Service is legally required to use the minimum power necessary to communicate. Many shortwave broadcasting services are barely above the local noise floor and yet are completely intelligible on a modern shortwave receiver. Recent developments of digital techniques in both services promise even improved ability to carry on communication even at S/N ratios of unity or less. With this obvious incompatibility with BPL, the Commission should provide guidance to the BPL operators on which HF band segments have weak signal users and which do not. I suggest the requirement that they either do not operate in or operate in the noise floor in those segments that have weak signal users.

Then there is the problem of timeliness. The NPRM is completely silent on an acceptable interval between the identification of harmful interference and the elimination of the interference. History teaches us that utilities are quite slow in resolving existing RFI noise problems. I can appreciate that part of that delay is in identifying the actual fault and engineering a solution, but neither should be an issue for BPL interference, particularly with an over the air ID. The flexibility present in OFDM technology allows the shifting of the carrier frequency as quickly as the frame rate. This means that the BPL operator can begin frequency shifting within moments of receiving notification. It would be reasonable to allow some time to achieve this, but if it is not successful the BPL device should be shut down, as provided for in Part 15. I would suggest that 10 minutes is a reasonable time to achieve the shift before shutdown. The BPL device should not attempt to reuse the abandoned spectrum without communicating with the interfered with service. It further follows that this provision needs a monetary incentive to insure compliance. I would propose a penalty of $10,000 per day per device upon failure to comply. This time requirement would also avoid the issue of a utility "dragging their feet" in order to stall eliminating an interference issue.

NOTIFICATION

The text of the NPRM at paragraph 43 states "The objective of the proposed notification would be to establish a publicly accessible database for Access BPL information to ensure that the location of Access BPL systems and their operating characteristics are identified if harmful interference occurs and to facilitate interference mitigation and avoidance measures." The proposed part 15 amendment neither requires the database to be public nor accessible. The use of the database as an identification device is completely worthless if it is not accurate, available and accessible on a real time basis. Whatever body is chosen to maintain this database must be required to update it at least daily and provide access both over the Internet and by phone to a live, knowledgeable BPL operator representative, 24/7. Again, I feel this

requirement needs a monetary incentive to insure compliance and recommend the same $10,000 per day penalty.

Part 15 is very clear that both the Part 15 device and the accompanying literature must contain specific notices about interference. This requirement must also apply to BPL and must be provided to all affected parties. Obviously, nobody is going to climb a pole to read a notice, so I propose that all parties within a mile of an electric line carrying BPL receive the BPL specific part 15 notice, whether they subscribe to the service or not. Also, since there is customer turnover in any utility service, the notice should be repeated monthly, or at least quarterly. I don't think any of the notices included in Part 15 applies best to BPL, so the Commission needs to propose a new notice containing the following points;

1. BPL is a service dependent on part 15 and has no priority to the frequencies it uses.
2. BPL must not cause harmful interference. BPL interference my be identified by an on/off pattern at the following times; _____ _____ _____ _____ . If any harmful interference is experienced, contact the BPL operator at _____ for immediate resolution.
3. BPL must accept any interference from any licensed service. Any disruption of BPL service from a licensed service is the sole responsibility of the BPL operator and the licensed service cannot be held liable and should not be contacted.
4. Updated information on the location, frequencies, modulation and ID times of the BPL devices may be found at _____, or by calling _____.

All subscribers to the BPL service should be required to sign this notice to indicate that they have read and understand it.

CONCLUSION

Alan Shark, President & CEO of the Power Line Communications Association said in a 3/24/04 letter to the Wall Street Journal "ham operators will continue to operate as if we didn't exist". Despite my skepticism of Mr. Shark's remark I respect the BPL industry's efforts to try to reach that goal. However, public results to date have not achieved an acceptable level of compliance. It would be irresponsible to not put in place requirements to insure that there is no interference with licensed services. This is not an increase in regulations, it is a codifying of a performance standard the BPL industry itself has insisted it can meet.

Again, I thank the Commission for the opportunity to present my comments.

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